

Amendments to the Claims

Please cancel claims 1-408 and 466-1690 without prejudice.

The following listing of claims will replace all prior versions and/or listings of claims in the application:

Listing of Claims:

1-408. (cancelled)

409. (original): A heater system, comprising:

an AC supply configured to provide AC at a voltage above about 200 volts;

an electrical conductor comprising one or more ferromagnetic sections, wherein the electrical conductor is electrically coupled to the AC supply, wherein at least one of the ferromagnetic sections is configured to provide an electrically resistive heat output during application of AC to the electrical conductor such that heat can transfer to material adjacent to such ferromagnetic section, and wherein such ferromagnetic section is configured to provide a reduced amount of heat above or near a selected temperature during use; and

wherein the selected temperature is at or about the Curie temperature of the ferromagnetic section.

410. (original): The heater system of claim 409, wherein the AC supply is configured to provide the AC at a voltage above about 650 volts.

411. (original): The heater system of claim 409, wherein the AC supply is configured to provide the AC at a voltage above about 1000 volts.

412. (original): The heater system of claim 409, wherein the heater system is configured to provide heat to a subsurface formation.

413. (original): The heater system of claim 409, wherein the heater system is configured to provide heat to a hydrocarbon containing formation.

414. (original): The heater system of claim 409, wherein the heater system is configured to provide heat to a hydrocarbon containing formation, and wherein the heater system is configured to pyrolyze at least some hydrocarbons in the formation.

415. (original): The heater system of claim 409, wherein the heater system is configured to provide heat to contaminated soil, and wherein the heater system is configured to decontaminate at least a portion of the contaminated soil.

416. (original): The heater system of claim 409, wherein the heater system is configured to provide heat to at least a portion of an opening in a subsurface formation.

417. (original): The heater system of claim 409, wherein the heater system comprises three or more electrical conductors, and wherein at least three of the electrical conductors are configured to be coupled in a three-phase electrical configuration.

418. (original): The heater system of claim 409, wherein at least one of the ferromagnetic sections comprises iron, nickel, chromium, cobalt, tungsten, or a mixture thereof.

419. (original): The heater system of claim 409, wherein at least one of the ferromagnetic sections has a thickness of at least about $\frac{3}{4}$ of a skin depth of the AC at the Curie temperature of such ferromagnetic sections.

420. (original): The heater system of claim 409, wherein the heat output below the selected temperature is greater than about 400 watts per meter of the electrical conductor.

421. (original): The heater system of claim 409, wherein at least one portion of the electrical conductor is configured to comprise a relatively flat AC resistance profile in a temperature range between about 100 °C and 750 °C.
422. (original): The heater system of claim 409, wherein at least a portion of the electrical conductor is longer than about 10 m.
423. (original): The heater system of claim 409, wherein the heater system is configured to sharply reduce the heat output at or near the selected temperature.
424. (original): The heater system of claim 409, wherein the heater system is configured such that the heat output from at least a portion of the system decreases at or near the selected temperature due to the Curie effect.
425. (original): The heater system of claim 409, wherein the heater system is configured such that an AC resistance of the electrical conductor increases with an increase in temperature up to the selected temperature, and wherein the system is configured such that an AC resistance of the electrical conductor decreases with an increase in temperature from above the selected temperature.
426. (original): The heater system of claim 409, wherein the system is configured to apply AC of at least about 70 amps to the electrical conductor.
427. (original): The heater system of claim 409, wherein at least one of the electrical conductors comprises a turndown ratio of at least about 2 to 1.
428. (original): The heater system of claim 409, wherein the system is configured to apply AC at about 180 Hz.

429. (original): The heater system of claim 409, wherein the heater system is configured to withstand operating temperatures of about 250 °C or above.

430. (original): The heater system of claim 409, wherein the heater system withstands operating temperatures of about 250 °C or above.

431. (original): The heater system of claim 409, wherein the electrical conductor is configured to automatically provide the reduced amount of heat above or near the selected temperature.

432. (original): A method of heating, comprising:
providing an AC at a voltage above about 200 volts to one or more electrical conductors to provide an electrically resistive heat output, wherein at least one of the electrical conductors comprises one or more electrically resistive sections; and
wherein at least one of the electrically resistive sections comprises an electrically resistive ferromagnetic material and provides a reduced amount of heat above or near a selected temperature, and wherein the selected temperature is within about 50 °C of the Curie temperature of the ferromagnetic material.

433. (original): The method of claim 432, further comprising providing the AC at a voltage above about 650 volts.

434. (original): The method of claim 432, further comprising providing the AC to at least one of the electrical conductors at or above the selected temperature.

435. (original): The method of claim 432, further comprising providing the AC at a frequency of about 180 Hz.

436. (original): The method of claim 432, further comprising placing one or more of the electrical conductors in a wellbore in a subsurface formation.

437. (original): The method of claim 432, further comprising providing an initial electrically resistive heat output when the electrical conductor providing the heat output is at least about 50 °C below the selected temperature, and automatically providing the reduced amount of heat above or near the selected temperature.

438. (original): The method of claim 432, further comprising allowing heat to transfer from at least one of the electrically resistive sections to at least a part of a subsurface formation.

439. (original): The method of claim 432, further comprising providing a relatively constant heat output when the ferromagnetic material is in a temperature range between about 300 °C and about 600 °C.

440. (original): The method of claim 432, further comprising providing a relatively constant heat output when the ferromagnetic material is in a temperature range between about 100 °C and about 750 °C.

441. (original): The method of claim 432, wherein an AC resistance of at least one of the electrically resistive sections decreases above the selected temperature to provide the reduced amount of heat.

442. (original): The method of claim 432, wherein the electrically resistive ferromagnetic material has a thickness of at least about $\frac{3}{4}$ of a skin depth of AC at the Curie temperature of the ferromagnetic material.

443. (original): The method of claim 432, further comprising allowing heat to transfer from at least one of the electrically resistive sections to at least a part of a subsurface formation, wherein the subsurface formation comprises a hydrocarbon containing formation.

444. (original): The method of claim 432, further comprising allowing heat to transfer from at least one of the electrically resistive sections to at least a part of a hydrocarbon containing formation, and further comprising at least some hydrocarbons in the formation.

445. (original): The method of claim 432, wherein the reduced amount of heat is less than about 400 watts per meter of length of an electrical conductor.

446. (original): The method of claim 432, further comprising controlling a skin depth in at least one of the electrically resistive sections by controlling a frequency of the applied AC.

447. (original): The method of claim 432, further comprising applying additional current to at least one of the electrically resistive sections as the temperature of such electrically resistive sections increases until the temperature is at or near the selected temperature.

448. (original): The method of claim 432, wherein an amount of heat output provided from at least one of the electrically resistive sections is determined by an amount of current applied to at least one of the electrical conductors.

449. (original): The method of claim 432, further comprising controlling an amount of heat provided by at least one of the electrically resistive sections by controlling an amount of current applied to at least one of the electrical conductors.

450. (original): The method of claim 432, further comprising applying current of at least about 70 amps to at least one of the electrical conductors.

451. (original): The method of claim 432, further comprising applying current of at least about 100 amps to at least one of the electrical conductors.

452. (original): A heater system, comprising:
an AC supply configured to provide AC at a voltage above about 200 volts;

an electrical conductor coupled to the AC supply, and wherein the electrical conductor comprises one or more electrically resistive sections, wherein at least one of the electrically resistive sections comprises an electrically resistive ferromagnetic material, wherein the electrical conductor is configured to provide an electrically resistive heat output during application of the AC to the electrical conductor, and wherein the electrical conductor is configured to provide a reduced amount of heat above or near a selected temperature that is about 20% or less of the heat output at about 50 °C below the selected temperature during use; and

wherein the selected temperature is at or about the Curie temperature of the ferromagnetic material.

453. (original): The heater system of claim 452, wherein the AC supply is configured to provide AC at a voltage above about 650 volts.

454. (original): The heater system of claim 452, wherein the AC supply is configured to provide AC at a voltage above about 1000 volts.

455. (original): The heater system of claim 452, wherein the heater system is configured to provide heat to a subsurface formation.

456. (original): The heater system of claim 452, wherein the heater system is configured to provide heat to a hydrocarbon containing formation.

457. (original): The heater system of claim 452, wherein the heater system is configured to provide heat to a hydrocarbon containing formation, and wherein the system is configured to pyrolyze at least some hydrocarbons in the formation.

458. (original): The heater system of claim 452, wherein the ferromagnetic material comprises iron, nickel, chromium, cobalt, tungsten, or a mixture thereof.

459. (original): The heater system of claim 452, wherein the heat output below the selected temperature is greater than about 400 watts per meter of length of the electrical conductor.

460. (original): The heater system of claim 452, wherein at least one portion of the electrical conductor is configured to comprise a relatively flat AC resistance profile in a temperature range between about 100 °C and 750 °C.

461. (original): The heater system of claim 452, wherein the heater system is configured to sharply reduce the heat output at or near the selected temperature.

462. (original): The heater system of claim 452, wherein the system is configured to apply AC of at least about 70 amps to the electrical conductor.

463. (original): The heater system of claim 452, wherein at least one of the electrical conductors comprises a turndown ratio of at least about 2 to 1.

464. (original): The heater system of claim 452, wherein the system is configured to apply AC at about 180 Hz.

465. (original): The heater system of claim 452, wherein the electrical conductor is configured to automatically provide the reduced amount of heat above or near the selected temperature.

466-1690. (cancelled)